

MID TERM I EXAMINATION, SEM. II, 2025
DEPT. MATH., COLLEGE OF SCIENCE, KSU
MATH: 107 FULL MARK: 25 TIME: 90 MINUTES

Q1. [5]

Solve the system of linear equations by Gaussian elimination method:

$$3x + 8y + 2z = -5$$

$$2x + 5y - 3z = 0$$

$$x + 2y - 2z = -1$$

Q2. [5]

Let

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 2 & 0 \\ 3 & 0 & 1 \end{bmatrix}$$

(i) Use elementary row operations to determine A^{-1} .

(ii) Use A^{-1} to compute $(A^T)^{-1}$.

Q3. [5]

(a) Find all values of x and y for which the following matrix A is symmetric.

$$A = \begin{bmatrix} -2 & x+2y & 0 \\ -1 & 1 & -2x-3y \\ 0 & 4 & 3 \end{bmatrix}$$

(b) Let A and B be square matrices of the same size such that A is symmetric and invertible. Show that $BA^{-1}B^T$ is symmetric.

Q4. [6]

If

$$A = \begin{bmatrix} 1 & 0 & -1 \\ 1 & 1 & 1 \\ -1 & 1 & 0 \end{bmatrix}$$

then show whether the given matrix is invertible, and if so, find adjoint of A . Also, find $\det(A^{-1})$.

Q5. [4]

Use Cramer's Rule to solve the following linear system

$$x + y = 1$$

$$x + 2y + z = -1$$

$$x + 3y - z = 2.$$